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Going up-skill

Exploring the transformation of the German skill formation system

The German skill formation system has been undergoing significant changes over the last two decades and most recently we observed massive expansion of higher education vis-à-vis the ‘traditional’ dual vocational training, which stands in contrast with the notion of equilibrium that has accompanied the German skill formation system in the literature. Yet, while the institutional underpinnings of the traditional model have been subject to comprehensive scrutiny and theorisation – including analyses of recent patterns of change – it remains unclear what arrangements have become institutionalised as skill formation ‘moves up’ from the dual vocational training to the university system. The article suggests that a (dominant) pattern of state coordination co-exist with a segmentalist pattern: the state mobilized resources and coordinated the provision of high skill formation to the benefit of all companies and in particular of small and medium sized enterprises that have relatively fewer resources and capacity to train; in parallel, large firms, with more resources and a large internal labour market, met their high skill needs also without state-mediation, by establishing direct relationships with higher education institutions through dual study programmes.

Keywords: skill formation; higher education; vocational training; institutional change

Introduction

Skill formation has long constituted a core component of the ‘German model’, identified in the literature as combining economic efficiency and relatively egalitarian social outcomes (Hall and Soskice 2001, Estevez-Abe, Iversen, and Soskice 2001, Iversen 2005). Key features of the skill formation system were instrumental to the coexistence of economic viability and social inclusion: companies would access the skills needed, and young people (including the low-achievers) could be integrated into the training system and subsequently the labour market. Thus, the comparative political economy (CPE) literature has traditionally considered the skill formation system – by and large equated to the dual apprenticeship system – as a crucial source

of institutional stability in the German political economy as the actors involved, crucially business and young people and their families, did not have any incentive to deviate from it (Soskice 1994).

More recent contributions have nevertheless challenged the picture of equilibrium that dominated the CPE literature. Linking the analysis to an underlying notion of liberalisation and grounding it in the mechanism of gradual institutional change, the German skill formation system has been variously re-assessed as ‘liberalising by exhaustion’, subject to policy ‘drift’ and becoming increasingly ‘dualised’ (Trampusch 2010, Thelen and Busemeyer 2012, Busemeyer and Trampusch 2013). Most analyses explaining these trajectories focussed on changing power relationships between actors, such as conflicts between labour and capital and the cleavage between small and large firms, with relentless secular trends, such as de-industrialisation, providing the functional underpinnings (Thelen 2014, Busemeyer 2012, Trampusch 2010). This literature – while theoretically enlightening and empirically rich – has however the limitation that it focussed by and large on changes inside the dual system, assuming implicitly that the skill formation system still equates to the dual vocational training system, although one that is undergoing a number of changes and that is subject to significant challenges (Thelen 2007, Culpepper and Finegold 1999).

Yet, a major change that we have been observing over the last decade – arguably the most profound change in the overall skill formation system – is in fact taking place outside the dual system. In particular, initial skill formation (broadly defined here as the last segment of education and training that young people receive before first entering the labour market) is increasingly moving away from the dual system to locate in the higher education system (Graf 2017, Baethge and Wolter 2015,

Lauder, Brown, and Ashton 2008). The expansion of university education vis-à-vis vocational training means that a policy area that has been traditionally at the core of the German model – the dual system – is being gradually replaced by one that was traditionally at the margins – higher education. This is the specific imbalance that the article seeks to explore.

In particular, we take as starting point macro-sociological analyses that identify a transition ‘from the dual system to higher education’ (Baethge and Wolter 2015) and we ask how key actors in the German political economy (government and employers in particular) are shaping this transition. The question has theoretical relevance because higher education has traditionally been associated with general skills, allocated through market-based mechanisms and typically found in liberal market economies (LMEs): how, then, are key actors in the quintessential CME managing the increasing centrality in the political economy of an LME-like institutional sphere? Empirically, we focus on the last decade, as it is from 2007 that the ‘imbalance’ between higher education and vocational training became more prominent: net entry rates in only five years between 2007 and 2011 went up from 36% to 51% (Hüther and Krücken 2014). We resort to descriptive statistics, document analysis, 26 interviews conducted with stakeholders belonging to the government, education, training and business sectors as well as the insights gained through the participation at the annual meeting of training managers of manufacturing companies of Baden-Württemberg (the list of interviews is available in Appendix).

The structure of the article is as follows: the next section reviews the sources of imbalance inside and outside the dual system; we then move on to show how the state mobilised public resources to finance the expansion of higher education and channelled them to meet business’ skills needs; the following section illustrates how

(large) firms directly sourced their high skills from the higher education sector through the establishment of dual study programmes; finally, we bring together the conclusions in the final section and we discuss the broader implications of the article.

The sources of imbalance in the German skill formation system

This section argues that the dual system has been gradually losing its centrality in the German political economy due to changes on both the supply and demand side. It first reviews the well-documented gradual liberalisation of the dual system and it then discusses more profound – yet less scrutinised – developments that are shifting the centre of gravity of the German skill formation system away from the dual system and towards higher education. This development is ascribed to two factors: key actors such as (large) employers and young people have been partly defecting from the dual vocational training system; and the economy has shifted towards knowledge-intensive sectors in the last twenty years, leading to lower demand for those mid-level specific skills typically provided by the dual system and higher demand for high-level skills.

The skill formation system has always been considered a crucial component of the German model of ‘Diversified Quality Production’ (DQP) (Streeck 1991, Sorge and Streeck 1987, 2016). It was not only highly successful from an economic standpoint but it also performed a social inclusion role as it integrated academically low-achieving pupils into the training system and, subsequently, the labour market. The DQP model built on ‘redundant capacities’ guaranteed efficient production processes, in particular through fast adaptation to changing demands, as illustrated by Sorge and Streeck (2016, 4):

‘diversification and customization of products and services for market segments attentive to quality and diversity, notably in more changeable task environments, needed a surplus of competencies because the uncertainty of existing and evolving demand rendered a precise prediction

of the competencies needed impossible; providing competencies at a currently “required” level risked underinvestment in competencies and, therefore, operational rigidity’.

‘Redundant capacities’ were the result of institutional ‘beneficial constraints’, as encompassing collective agreements setting high wages for manufacturing workers and codetermination in the workplace forced employers to invest in the dual vocational training system in order to keep productivity high and, therefore, marginal labour costs low. The system provided skills that were ‘broadly based and at a high level’ and available ‘even and notably for relatively “lower” work skills’ (Sorge and Streeck 2016, 4), easing the social inclusion of those at the low end of the skill distribution. Yet, as the ‘constraining’ effect of industrial relations institutions has been gradually eroding (Streeck 2009), the compromise between actors began to crumble. As the political power of large employers vis-à-vis unions and the government increased, they successfully pulled the system closer to their first order preferences – in alliance with various actors depending on the specific training policy issue – leading to gradual but transformative changes in the dual system (Busemeyer 2012). As a result, both the ‘economic efficiency’ and ‘social inclusion’ functions of the system were weakened.

Firstly, strengthened by government support in 2003, large employers achieved the re-introduction of shorter two-year apprenticeships, despite strong opposition of the unions and some dissatisfaction from part of the business community too, namely small and medium enterprises (SMEs). Large employers were traditionally in favour of a more flexible system, which could accommodate training of varying duration and modularisation. Unsurprisingly, the unions vigorously opposed such perspective as they feared it would lead to a segmentation of workers that would reverberate into their labour market position. SMEs who benefit from a

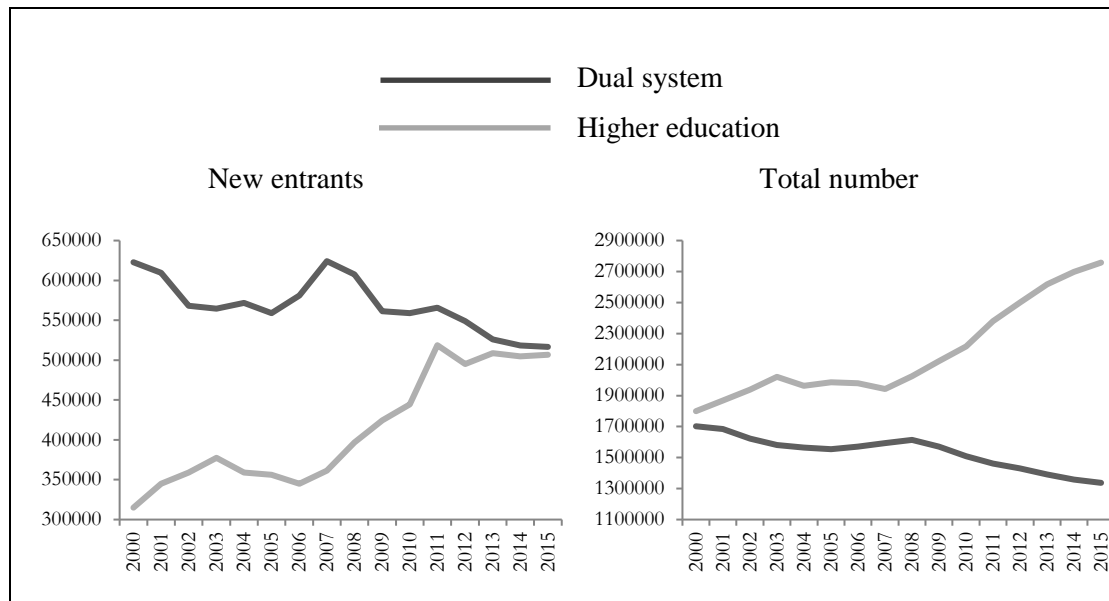
broad pool of workers with certified skills were also against this option (Trampusch 2010) not least because longer apprenticeships allow them recouping part of the cost of training (Steedman, 2010). But when in 2003 the government sided with large employers – following their (credible) threat to disinvest in the system – the system became modularised (Busemeyer 2012, Thelen and Busemeyer 2012, Busemeyer and Trampusch 2013, Thelen 2014). As a result, the skill formation system moved away from the ‘broad’ and relatively ‘high’ skills identified in the traditional DQP model, to come closer to a narrow and lower set of skills through the newly introduced shorter programmes responding to employers’ immediate needs, pushing the system towards a ‘segmentalist’ model (Thelen and Busemeyer 2012), i.e. a model in which skills needs of individual companies take priority over collective skills needs at the sectoral level.

Secondly, employers – this time around with unions’ support but against the government – also avoided an upgrading of the school system to bridge the shortfall of apprenticeship places that was triggered by the process of de-industrialisation. As in the late 1990s and early 2000s an increasing number of young people did not land an apprenticeship place, the government proposed to upgrade school-based training so that it could provide the same certification as the dual system, which could have helped the integration in the labour market of young people that did not enter the dual system (Thelen 2014, Busemeyer 2012). Yet, employers and unions sided together as they feared that an upgrading of the (state-dominated) school-based training would undermine the general principle of self-governance by the social partners of the training system. As a result, the school-based system was not upgraded and the majority of young people that do not land an apprenticeship place end up in the so-called transition system, a set of training measures that are not subject to standardised

certification and that carry little labour market value. This development weakened the social inclusion dimension of the dual system as an increasing share of young people received lower quality training and workers at the low end of the skill distribution have become increasingly less likely to receive high level certified training (Busemeyer 2012).

Yet, large firms are not the only actor that defected from the traditional system in the early 2000s. We observed over the last two decades – and most prominently in the last decade – that the behaviour of young school-leavers also changed significantly, opening up to profound imbalances outside the system, namely its progressive marginalisation vis-à-vis the higher education sector. A sharp picture of this development emerges if we compare the number of incoming students that have been enrolling in apprenticeship programmes and in higher education programmes, as well as the total size of the dual system with that of the higher education system since 2000 (figure 1).

Figure 1. New entrants and total number of students in the dual system and in higher education in Germany



Source: own calculations based on Statistisches Bundesamt

Figure 1 suggests that the changes taking place in the German skill formation system go beyond the trajectories of institutional change inside the dual system and entail a more general shift of the centre of gravity of the overall skill formation process away from the dual system and towards the higher education sector. New entrants in higher education increased between 2000 and 2015 from just over 300,000 to around 500,000 and the total number of students enrolled in universities increased over the same period from around 1.7 million to 2.7 million. Simultaneously, the apprenticeship system experienced drops in both new entrants and total number of students. The stark expansion of higher education vis-à-vis vocational training has been ascribed to two simultaneous trends: (i) increasing ‘credentialism’ on the side of young people and their families and (ii) the changing composition of the labour market, which relies increasingly on higher-level skills (Baethge and Wolter 2015, Graf 2017, Fleckenstein, Saunders, and Seeleib-Kaiser 2011, Oesch 2013, Oesch and Rodríguez Menés 2010). Baethge and Wolter show in particular that the long-term

trends in Germany secondary education system fuelled the expansion of enrolments at the tertiary level:

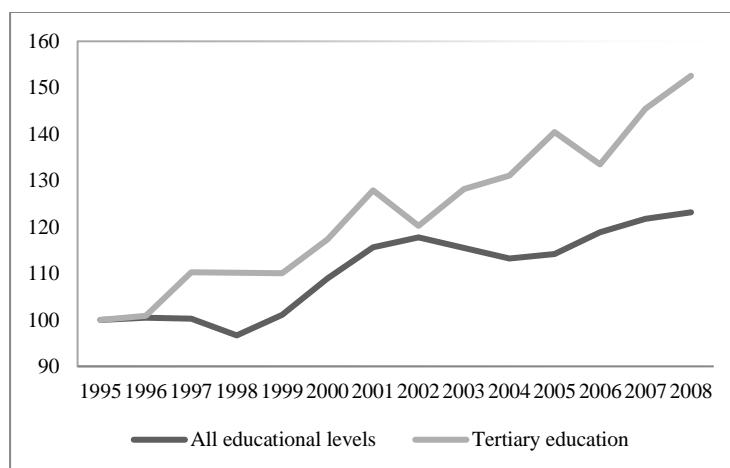
‘There has been a dramatic change in the educational decisions determining the allocation of pupils across the different school types within the secondary school system. In the early 1950s the share of pupils transferring from the primary to the lower secondary school [...] amounted to more than 75% nationwide; this proportion decreased continuously to less than 12 % in 2012 [...] the participation rate in the grammar school track (at grade 5 or 7) leading to the entitlement necessary to access higher education has expanded in the same period from 15 % to more than 40 %’ (Baethge and Wolter 2015, 103).

This trend in secondary schooling had an asymmetric effect on the distribution of students between vocational training and higher education as it triggered a massive expansion of potential demand for higher education while shrinking potential demand for the dual system (Baethge and Wolter 2015, 104). Secular macro-sociological trends played a prime part in this development as ‘the allocation processes between alternative school types seems to be the increasing level of educational awareness, aspirations and ambitions in wider parts of the population’ (Baethge and Wolter 2015, 104).

But there is also a demand side of the story. In particular, the changing composition of the labour market provided a further set of functional underpinnings: the occupational distribution saw a stable decline, in Germany as in most advanced capitalist countries, of intermediate occupations (typically in need of intermediate skills delivered by the vocational system) to the advantage of professional and managerial occupations (typically in need of a higher education) (Oesch 2013, Oesch and Rodríguez Menés 2010); furthermore, Germany experienced a significant expansion of knowledge-intensive sectors, across both high-end manufacturing and

services (Thelen forthcoming). While it is true that, against this background, German employers – small ones in particular – struggle to fill apprenticeship positions due to demographic changes and the decline of popularity of dual vocational training, the emergent knowledge-based economy required a strong provision of higher-level skills. Figure 2 shows the trend in employment compared to 1995 of knowledge intensive sectors (high tech manufacturing and high end services) drawing a distinction between the general employment trend and the specific trend for tertiary educated workers. There emerges a strong expansion of knowledge intensive sectors, and a particularly steep expansion in these sectors of those with a tertiary education.

Figure 2: Employment in technology and knowledge-intensive sectors at the national level, by level of education (1995 = 100)



Source: own calculations based on Eurostat

Yet, while there is a clear demand for higher-level skills, as shown by figure 2 and as proved by extremely low unemployment rate of university graduates, which has been at around 4% over the last decade (Gardner 2011a), the expansion of higher education represents a double-edged sword for business: on one hand, higher education is better placed than vocational training to provide the high-level analytic

and interpersonal skills that are increasingly important in knowledge-based labour markets (Mayer and Solga 2008); on the other hand, in the transition from the dual system to higher education, businesses lose the capacity to directly shape the supply of skills, heightening the risk of skill mismatches and shortages. Indeed, through the dual system, firms offer apprenticeships in the occupations that they need, while the allocation of students to disciplines in higher education can only be influenced indirectly by businesses through labour market signals. The latter are, however, only one among several factors that shape secondary school leavers' choice of their university paths and research shows that the disciplines that tend to be avoided by students are in Science, Technology, Engineering and Mathematics (STEM) fields (BusinessEurope 2011, Cedefop 2016), i.e. those fields that German employers consider crucial for their knowledge-intensive sectors (see e.g. BDA 2008, BDA, HRK, and BDI 2011). The next two sections of the article illustrate how key actors shaped the transition up-skill of the German political economy, discerning two parallel developments: a government-led pattern of state-coordination and a (large) firm-led pattern of 'segmentalism'.

Mobilizing state resources: the Higher Education Pact

In 2007 it became clear for the government that the number of entrants into higher education was growing beyond previous projections (Gardner 2009, 2011b, see also figure 1). This trend was expected to further exacerbate by 2011 when a change in legislation in four Länder¹ shortened compulsory schooling by one year thus leading to a double cohort of students enrolling into university. In response to the steep

¹ Bavaria and Lower Saxony implemented this change in 2011, Baden-Württemberg and Berlin in 2012.

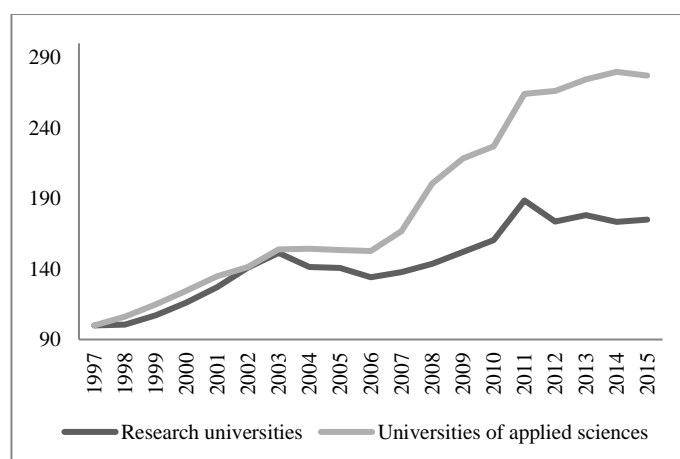
expansion of university enrolments the government launched in 2007 the Higher Education Pact, which allocated public funds to finance the additional enrolments in higher education. The policy initiative had two main goals. Firstly, universities of applied sciences (or Fachhochschulen, i.e. teaching-oriented higher education institutions with close ties with local labour markets) were to be expanded relatively more than traditional research-oriented universities. Secondly, STEM subjects had to be expanded the most through the new policy (BMBF 2014, 2009).

The official agreement enacting the Higher Education Pact, which was signed by the federal government and each of the Länder, makes clear that the Pact has a human capital development aim as it sets out at the very beginning of the document that the Pact is a way for the Federal government and the Länder to meet the demand of the labour market for skilled labour (GWK 2007, 1). Thus, government documents on the implementation of the Higher Education Pact issued by the GWK and the BMBF specify that labour market demands were to be met through the expansion of Fachhochschulen and study places in the STEM areas (GWK 2016, 3, BMBF 2014, 3, 2009, 2). With respect to privileging the expansion of universities of applied sciences over traditional research universities, the choice was partly driven by cost considerations on the side of the government, as universities of applied sciences require lower public funding compared to traditional universities, but also by the greater perceived readiness of universities of applied sciences to meet societal demands (interview 2).

Furthermore, the expansion of universities of applied sciences through the Pact also met the long-standing employers' demand for practical skill orientation of

study programmes² (Toens 2009). Indeed, several studies over the course of the years showed that employers valued the practical orientation of graduates from universities of applied sciences and that they remunerate the qualifications from these higher education institutions equally to, if not better than, graduates from traditional universities (Kupfer 2013, Ertl 2013, IngenieurwesenStudieren.de 2018). Employers' appreciation for Fachhochschulen graduates is illustrated for instance by the results of a recent study carried out by the VDI and based on a survey of companies employing engineering graduates, which found among other things that the 'integration of practical semesters and modules is stronger in universities of applied sciences than in universities' (VDI 2016). The clear prioritisation of universities of applied sciences over universities that was promoted by policy-makers (Gillmann 2011) can be clearly detected in figure 3, which compares the development of relative new enrolments in research universities and in universities of applied sciences, showing a clear surge in the latter since the launch of the Higher Education Pact in 2007.

Figure 3 Relative intake of 1st year students at universities and universities of applied sciences (1997 = 100)



² Moreover, government policy strengthened the research profile of Fachhochschulen through funding programmes targeting specifically *applied* research, such as the programme 'Innovative Hochschule' which promotes research interactions in particular between universities of applied sciences and SMEs (BMBF n.d.).

Source: own calculations based on Statistisches Bundesamt

The development of universities of applied sciences, with their ability to provide work-ready graduates to the labour market, is of particular significance to SMEs that – compared to large companies – tend to be more resource-constrained when it comes to training. Indeed, the vice-president of the Verband Deutscher Maschinen- und Anlagenbau (VDMA), representing companies – for the most part SMEs – in the mechanical engineering industry, praised universities of applied sciences and argued that ‘Fachhochschulen show that more praxis in study programmes is possible’ and that ‘only a heavily practice-oriented education optimally prepares students for an industry career’ (VDI 2016). Along the same lines, the ministers of Education in Eastern Federal states defined state investment in universities of applied sciences crucial to ensure appropriate skill supply (in addition to investment in innovation) because those Federal states are characterised by weak infrastructures and a prevalence of SMEs (Hesse et al. 2017). Indeed, enterprises of size below 250 employees find difficult to provide the work-based training necessary for dual study programmes (Wolter et al. 2014) and to attract skilled workers compared to larger companies (DIHK 2017), hence they are expected to benefit from state-provided skills.

The expansion of universities of applied sciences also represented a mechanism for expanding STEM graduates, being STEM a traditional area of strength of universities of applied sciences (interview 7). Thus, looking at the subject distribution of the additional study places, we notice that STEM subjects have gained significantly, relative to other areas. The most recent report on the implementation of the Higher Education Pact shows the trend clearly: engineering increased by almost

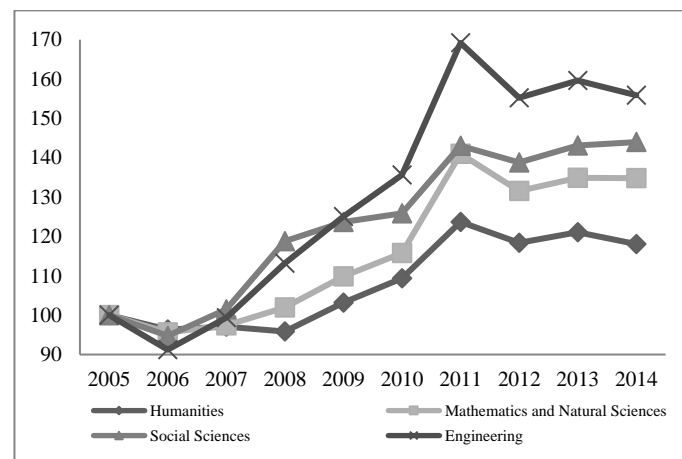
57% between 2005 and 2015, while social sciences expanded by 44% and humanities by only 18% (GWK 2016 p. 11).

Lobbying from businesses was an important factor shaping the expansion of study places in engineering and in the broader STEM subjects. The Cologne Institute for Economic Research, a research centre primarily financed by business, published several reports on the shortage of STEM workers, and the BDA released several statements following the 2008 campaign ‘Bachelor Welcome – Securing young STEM!’, when the BDA painted a rather gloomy picture, suggesting that the lack of STEM graduates constituted a ‘dramatic bottleneck’ in a context where ‘STEM graduates are not only required in the classical manufacturing sectors such as the metal and electrical industry, but increasingly also in the service sector. New technological challenges also require new qualification profiles’ (BDA 2008 p. 1).

The same fear was reiterated in 2011, in conjunction with double cohort of high school graduates coming up in several states. Thomas Sattelberger, chairman of the BDA/BDI/HRK working group University/Industry, urged the government to expand the STEM potential of the country: ‘Double graduation cohorts represent a huge reservoir of talent for the economy. Given the alarming shortage of skilled workers, it would be outrageous to shut the doors of higher education to so many young people. In the STEM fields of science, technology, engineering and mathematics alone, companies currently have demand for more than 150,000 professionals’ (BDA, HRK, and BDI 2011). Policy-makers used therefore the Higher Education Pact not only to meet the ever-growing demand for university education but also to respond to the skill shortage highlighted by business. A KMK representative argued that the efforts of ‘all kinds of well organised stakeholders, under them big companies, local firms, associations [...]’ did ‘shape the political

opinion in a way’ and that indeed the STEM area was chosen ‘because of the urgent need of engineers und the upcoming discussion on the shortage of skilled “MINT³”-workers’ (interview 7). As captured in figure 4, the expansion of STEM subjects was indeed successful: businesses, after voicing their worries in the mid-2000s and early 2010s, argued in 2015 that ‘years of public campaigns for more engineers and technical skills have paid off’ and that given the increase in new entrants in engineering degrees between 2008 and 2013, ‘the lack of skilled labour is no longer a threat’ (Gillmann 2015).

Figure 4 New students in higher education by (selected) disciplines (2005 = 100)



Source: GWK (2016, 11)

Large firms securing high skills: the growth of dual study programmes

Next to the increased provision of STEM skills via the Higher Education Pact, large business contributed directly to the process by offering since the 2000s an ever-increasing number of places in dual study programmes – by and large housed at universities of applied sciences. The emergence of dual study programmes has been a defining feature of the higher education landscape over the last decade in particular

³ MINT is the German acronym for STEM.

(Powell et al. 2012, Powell and Solga 2010, Graf 2013, 2017). According to the Federal Institute for Vocational Education and Training (BIBB), dual study programmes can be defined as:

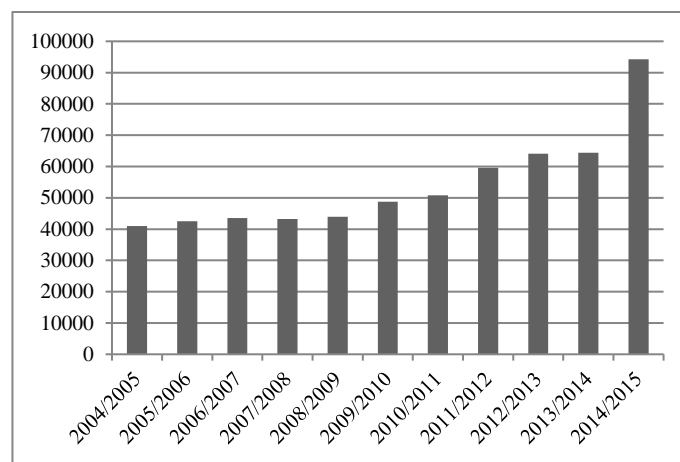
‘courses [that] combine a degree programme at a university or a university of cooperative education (Berufsakademie) with vocational training and/or relevant practical employment. This greater emphasis on practical relevance is the key difference between dual and standard degree courses. One special feature is the close integration of academic and vocational content in the curriculum. This is achieved through contractual ties between the cooperation partners, namely the company and the higher education provider’ (Kupfer and Stertz 2011, 29).

In addition to the greater focus on practical training, dual study programmes also differ from other higher education degrees in terms of the selection process: while at universities or Fachhochschulen, degree choice is made between prospective students and higher education institutions, in the case of dual study programmes, there is a triangular relationship between the firm sponsoring the degree, the higher education institution offering it and the student enrolled in it. In particular, the firm decides which programme (in terms of discipline) and how many of them to sponsor based on its skills needs, and once it stipulates an agreement with a higher education institution offering the programme(s), it is the firm that selects the candidate(s) that will be enrolled in the programme(s) (Kupfer and Stertz 2011, Wolter et al. 2014).

In a rich historical reconstruction on the establishment and expansion of dual study programmes, Graf (2013) illustrates how these programmes have a long history, having been first established in 1972 in one Land, Baden-Württemberg, upon the initiative of a number of large firms predominantly in the manufacturing sector (Graf 2013, 102). However, the programmes remained a niche in the German higher education landscape, until very recently. Indeed, it is not until the early 2000s that dual study programmes became available in every Länder and the number of students

became significant, reaching around 95,000 enrolled students in 2014, after – as recently as 2004 – there were only 40,000 students enrolled in these programmes (BIBB 2014, 12). The over 90,000 students are now enrolled across the country in over 1,500 dual study programmes – again registering a steep increase from the just 500 programmes available in 2004 (BIBB 2014, 10, see also Figure 5). Furthermore, these figures are said to be conservative as ‘providers of dual study programs report student numbers on a voluntary basis’ (BIBB, 2011a, p. 23 cited in Graf 2013, 98). The expedite growth of students in and offer of dual study programmes have prompted the observation that, growing out of a niche, these programmes are currently contributing to shaping institutional change in the German HE system (Graf 2014, Thelen forthcoming, 2014).

Figure 5 Number of students enrolled in dual study programmes



Source: Ausbildung Plus

The reasons for the expansion of dual study programmes overlap significantly with the reasons for the expansion of universities of applied sciences and STEM subjects through the Higher Education Pact. Dual study programmes have been praised by the business community for their ability to train work-ready graduates. The

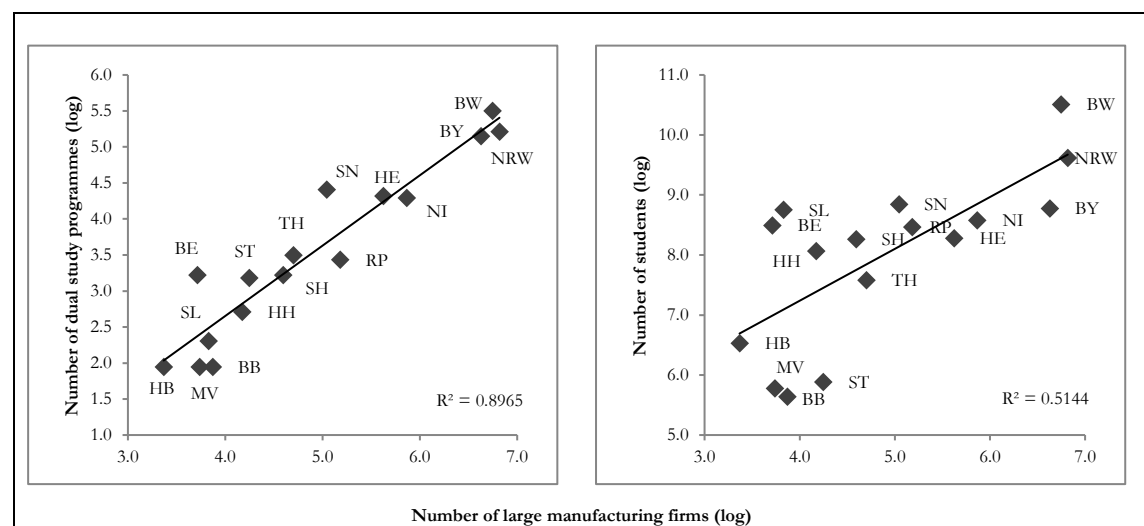
VDI study on engineering education concluded that dual study programmes are a ‘success model’ and that ‘69 percent of the business managers consulted indicate that they have gained good to very good new recruits through the dual studies programmes’ (VDI 2016). Similar conclusions were reached in an in-depth study of business’ experience with dual study programmes, which found that ‘[t]he satisfaction with dual study graduates is very high, and businesses assume that qualities such as diligence, durability and teamwork are particularly pronounced in dual studies graduates’ (Wolter et al. 2014, 30). Furthermore, companies appreciate the immediate employability of dual study graduates upon completion of the programme (Wolter et al. 2014, 108), as illustrated by a top HR manager of a large manufacturing company:

‘Through the work-based experience I have the opportunity to vary [the tasks] and to adapt them to the needs of the company. And the advantage is that the students, when they finish, they are highly sought after in our company because they are already familiar with the internal procedure. Therefore, I don’t need to train them much, do I?’ (Interview 21)

In addition, businesses resorted to dual study programmes in the context of the feared skill shortage as they saw these programmes as a way to tie future STEM workers to their company early on their career (interviews 1, 3, 4). As in the case of the Higher Education Pact, universities of applied sciences emerged as an ideal partner for the development of dual study programmes given that ‘traditional universities are still very reluctant [to participate in dual study programmes], they say they cannot be oriented towards the short-term needs of the labour market’ (interview 2). The distribution by discipline of dual study programmes also resembles the distribution of study places achieved through the higher education pact with engineering representing the largest group of dual study programmes followed by social sciences (in particular business administration) (BIBB 2014).

However, differently from the Higher Education Pact, which has developed across the entire countries and it has provided significant benefits to SMEs, dual study programmes have developed very unevenly across the national territory with a strong concentration in those areas characterised by large manufacturing firms, as that is the typical profile of company offering such programmes (Wolter et al. 2014, Graf 2017, 2013). This is not coincidental given that dual study programmes require a financial commitment and an organisational infrastructure on the side of the firm that SMEs can hardly afford. Plotting the number of dual study programmes offered in each Land against the number of large manufacturing firms, we find indeed a strong correlation, with three Lander with a high concentration of large manufacturing firms (Bavaria; Baden-Württemberg and North Rhine-Westphalia) accounting for approximately 60% of all dual study programmes (BIBB 2014) and 60% of all students enrolled in these programmes (BIBB 2016). Indeed, the presence of large manufacturing firms in a given Land is strongly correlated with the development of dual study programmes – both in terms of programmes on offer and of students enrolled (see figures 6).

Figure 6: Large firms' presence and the distribution of dual study programmes and students by Land



Source: own calculations based on Statistisches Bundesamt and BIBB

Conclusion

Recent contributions in the comparative political economy literature produced compelling analyses of the gradual liberalisation of the German vocational training system. Yet relatively little is known about a broader imbalance of the skill formation system, namely the progressive loss of centrality of the dual apprenticeship system in favour of the higher education system. The article explored this issue by assessing the mechanisms that underpin skill formation as Germany ‘moved up-skill’. We noted the establishment of two parallel trends, both aiming at creating a set of high skills that retain a central role in the German knowledge economy, i.e. STEM skills. The first development is exemplified by the Higher Education Pact and it emerged as a state-led mechanism aimed at favouring the expansion of universities of applied sciences and – with them – increasing the supply of labour market-ready graduates in STEM subjects in particular (see Schulze-Cleven and Olson 2017 for a broader theorisation of the changing state-university relationship). The second development, exemplified by the growth of Dual Study Programmes, occurred without state mediation and it has been driven by large firms in direct cooperation with higher education institutions. The development of dual study programmes conforms to a segmentalist logic (Graf 2013, 2017) akin to the one that characterised the dual apprenticeship system in recent years (Thelen and Busemeyer 2012). However, the segmentalist logic emerged in the dual apprenticeship system due to the erosion of beneficial constraints, as the balance of power shifted towards (large) employers who could tailor the system to their specific needs. In contrast, dual study programmes conform to this logic at the outset because they were never embedded in the traditional coordinating institutions: Social partners have never been as actively involved in the governance of higher education

as in the case of dual vocational training; furthermore, networks of firms collaborating for offering dual apprenticeships (e.g. Verbundausbildung) do not exist (yet) in the sphere of higher education.

These developments seem to reflect trends in the broader German political economy, and in the industrial relations arena in particular, which has experienced a decline of coordination between social partners (see e.g. Anonymous 2017a) while the state played a more prominent regulatory role, e.g. through the introduction of the minimum wage and the reregulation of agency work (Marx and Starke 2017, Anonymous 2018). While limited government intervention used to be considered a strength of the German model vis-à-vis widespread coordination across firms and between social partners (Streeck 1997), the need of a more prominent role of the state as regulator and coordinator of the economy seem now to have been acknowledged both by unions, which have always defended the *Tarifautonomie*, as well as by policy-makers, who have supported state intervention.

Moving forward, it will be interesting to see whether SMEs and unions, which are currently marginal actors in the provision of dual study programmes, will be able to build network-based institutions around dual study programmes or whether they will rather rely increasingly on the state for the provision of high skills. The response to this development will by and large determine whether the emergent system of high skill formation will remain underpinned by a twin logic of segmentalism and state coordination running in parallel, or it will reproduce in the higher education sector some of the (collectively-) coordinated logic that long characterised the dual apprenticeship system.

The analysis of the changing pattern of skill formation in Germany linked to the growing importance of higher education prompts two final broader observations.

Firstly, the traditional model built around the apprenticeship system was able to reconcile economic efficiency and social inclusion – and indeed its ability to do so has been identified as a distinctive feature of the German skill formation system (recall the second section). As skill formation “moved up” to the higher education sector, economic efficiency has been maintained as the state, through the Higher Education Pact, and large employers, through dual study programmes, provide the high skills needed in knowledge-based labour markets. Yet, the integration of academic low achievers in the skill formation system might become more difficult as skill formation takes place in higher education, which is usually associated with higher academic abilities compared to the more practically oriented apprenticeship system. In this respect, recent literature identified growing social exclusion in the German skill formation system driven by ever more demanding apprenticeship profiles that prove difficult for academic low achievers to access (Thelen 2014, Kupfer 2010, Jacob and Solga 2015). This socially exclusive trend is likely to be further compounded by the expansion of higher education. Creating suitable pathways for the integration of academic low achievers into the training system (be them high-end apprenticeships or higher education degrees) is therefore a challenge of paramount importance for policy-makers in the context of ever higher and more complex skill requirements (Anonymous 2017b).

Secondly, even if Germany is moving towards skill formation in higher education, which is generally associated with liberal market economies such as the US or the UK, the specific direction in which actors channelled the expansion of higher education suggests the existence of distinct national patterns of high skill formation (Anonymous Forthcoming). In this particular case, we have seen how state and employer activism shaped the supply of a particular set of skills, notably practice-

oriented STEM skills. Such development is profoundly different from the expansion of higher education in liberal market economies, where the high skills supplied by the higher education system tend to be the outcome of market-based interactions between students and universities (Slaughter and Cantwell 2012, Slaughter and Rhoades 2004, Slaughter and Leslie 1997), with limited intervention of governments or employers in directly shaping the supply of a particular set of skills.

Appendix: list of interviews

Interview code	Interviewee affiliation
Interview 1	University association (HRK)
Interview 2	University association (HLB)
Interview 3	Employer association (BDA)
Interview 4	Employer association (BDA)
Interview 5	Employer association (VDMA)
Interview 6	Government (BMBF)
Interview 7	Government (KMK)
Interview 8	Think-tank (Stifterverband)
Interview 9	University of Applied Sciences A
Interview 10	University of Applied Sciences A
Interview 11	University of Applied Sciences B
Interview 12	University of Applied Sciences B
Interview 13	University of Applied Sciences C
Interview 14	University of Applied Sciences C
Interview 15	Research university A
Interview 16	Research university A
Interview 17	Research university B
Interview 18	Research university C
Interview 19	Research university C
Interview 20	Research university B
Interview 21	Large manufacturing company A1
Interview 22	Large manufacturing company A2
Interview 23	Employers' association (Suedwestmetall)

Interview 24	Large manufacturing company B
Interview 25	Large manufacturing company C
Interview 26	Employers' association (Gesamtmittel)

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